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September 23, 2002
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SEP 23 2002
T.C. 2800

Mr. Peter Medley, Examiner
US Patent and Trademark Office, Group Art Unit 2834
Washington, DC 20231

Re: US Pat. Appln. S/N 09/685,718
"METHOD UTILIZING THE SAW VELOCITY DISPERSION EFFECT FOR WEIGHTING BY SHAPING THE ELECTRODE FINGERS...."
Our file: A-378-0 US

Dear Mr. Medley,

Thank you for the opportunity to discuss the subject matter with you, hopefully we can do this today by telephone at your time 9:00 AM.

I have attached a Power of Attorney form signed by the inventor, adding my name as attorney of record.

I have also attached a proposed new claim (31) and a table of comparison between the prior art and the present invention.

Please review these materials so that we can discuss them today or another convenient time.

A significant point to keep in mind was stated in the earlier response filed by the previous attorney on Jan. 4, 2002. This refers to the fact that the Yatsuda reference does not relate to interdigital transducers nor to the weighting of IDTs. In general, the prior art discloses fingers which are arranged and tapered to compensate for and reduce the effects of velocity dispersion. As he stated in that response, "In stark contrast to the prior art, the finger shaping called for by the present invention is provided for precisely the opposite reason, i.e. in order to induce the velocity dispersion effect, thereby weighting the transducer itself and/or focusing the propagated SAW beam."

It is believed that new claim 31 presents language defining over the prior art with regard to the variable ratio inducing SAW velocity dispersion, to provide a weighting mechanism to control weighting coefficients for achieving desired frequency characteristics of the IDT.

Looking forward to discussing this matter with you.

Sincerely,

Edward Langer, Pat. Atty
Registration No. 30,564

Date: Sun, 22 Sep 2002 19:25:24 +0200
From: Yuri Abramov <yuria@scopus.net>
Subject: key words such as: "periodicity","arrangement","shaped","configured", etc.,
To: Yerucham Teitelbaum <yerucha1@netvision.net.il>, Ed Langer <edlanger@netvision.net.il>
Cc: yuri_a@netvision.net.il
X-MIMEOLE: Produced By Microsoft Exchange V6.0.5762.3
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X-MS-Has-Attach:
X-MS-TNEF-Correlator: <714864C61F42474DA303505B01544D1524322A@hermes.scopus.

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Edward and Yerucham,

In order to help you to find important key words such as: "periodicity","arrangement","shaped","configured", etc., into the disclosure description, I pay you attention to:

(a) Page 8, lines 23-30
The second term is defined by the mechanical load, i.e. by densities and elastic constants both of the piezosubstrate and the electrode finger material, as well as by the periodicity of the fingers and their geometry: thickness and width. Both of the terms vary smoothly with an electrode finger's width. Calculations show that if an electrode finger's width is in the range from 25% to 60% of the distance between the adjacent finger's centers, both of the terms are approximately proportional to the electrode fingers width. So if the electrode fingers change in width along their length, the SAW velocity dispersion is expected to occur in the same direction.

(b) Page 11, lines 23-25
The SAW velocity dispersion depends on both electrical and mechanical load, i.e., it depends on the material both of the piezoelectric substrate and the electrode fingers and depends on the thickness, configuration, polarity and arrangement of the electrode fingers.

(c) Page 15, lines 24-27
SAW velocity dispersion causes frequency response widening for an interdigital transducer with electrode fingers which change in width along their length, in contrast to a transducer with conventional electrode fingers, i.e. wherein the fingers are either of uniform width along their length or of width configured in alignment with tapering of the transducer.

(d) Page 21, lines 1-2
SAW velocity dispersion causes frequency response widening for an interdigital transducer with electrode fingers which change in width along their length, in contrast to a transducer with conventional electrode fingers, i.e. wherein the fingers are either of uniform width along their length or of width configured in alignment with tapering of the transducer.

(e) Page 24 -- Claim 1
A transducer for surface acoustic waves, said transducer comprising a plurality of interdigitized electrode fingers, including at least one interdigitized electrode finger which is provided with a shape that changes in width along said finger's length, provided that where a transducer is tapered, said electrode finger width is not uniformly changed to maintain alignment with tapering of the transducer,...

(f) Page 24 -- Clam 3
A transducer according to claim 1, wherein said electrode fingers are arranged without regard to uniformity of periodicity along the lengths of electrode fingers.

(g) Page 24 -- Clam 4
A transducer according to claim 1, wherein said electrode fingers are arranged without regard to uniformity of periodicity in the direction of the wave propagation through said transducer.

(h) And even General Claim 23:
A SAW transducer having electrode fingers shaped in order to produce a SAW velocity dispersion effect.

that assumed any shaping to achieve purposely the SAW velocity dispersion.

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Proposed (Do NOT Enter)

Applicant's new independent claim (Sep.23, 2002)

3~~1~~. A weighted SAW inter-digital transducer (IDT) having at least ~~two~~ internal electrode fingers shaped and arranged with a predetermined periodicity, each of said fingers having a shape defining a ratio between its width and its **arrangement-periodicity, such that said ratio varies substantially** along each of said fingers, said **variable** ratio inducing SAW velocity dispersion along said fingers, thereby providing a weighting mechanism to control weighting coefficients for achieving desired frequency characteristics of the IDT.

Table 1. Regarding the independent claim ~~1~~(rejected), 2~~4~~(rejected), 3~~1~~ (new).

Row No	Prior Arts (including Yatsuda's Disclosure)	Applicant's Disclosure
1	**Tapered IDT** The whole IDT and the fingers are similarly tapered to achieve a ratio ***w(y)/p(y)* = Constant**, thereby providing a substantial **absence of SAW velocity dispersion**, where ***w(y)*** is the finger's width along their length and ***p(y)*** is the periodicity arrangement of the fingers.	**IDT Weighted By Novel Mechanism** A **variable** ratio, for example in Applicant's Fig. 3, results the finger shapes **substantially different** from the shape of the overall IDT. The fingers are trapezoidal, while the IDT is substantially rectangular.
2	**Tapering As A Weighting Mechanism** Yatsuda illustrates periodicity of fingers grating in Fig. 2, where the overall IDT is tapered. The periodicity is changed from P_H to P_L, i.e. from high periodicity to low periodicity. A periodicity tapering causes that the voltages between fingers are distributed with different periodicity from top to bottom of the "fan-type" IDT. A tapered IDT provides weighting, because distribution of voltages between fingers varies in periodicity from top to bottom.	**Velocity Dispersion As A Weighting Mechanism** The disclosed SAW IDT is weighted by the novel mechanism of SAW velocity dispersion. When SAW velocity is dispersed along **internal** fingers, we get the effect of different time-delay of SAW beams, propagating in different SAW tracks for each ***y***. The time-delay distribution causes a phase weighting of the SAW tracks distributed along the fingers. The distributed phase weighting is utilized for weighting coefficients definition.

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3	The frequency characteristic of a "fan-type" IDT (Applicant's Fig. 2b) having tapered fingers is calculated by: $A_{25}(\omega) = E(\omega)\sum_{n=1}^{N} p_n \int_{-L/2}^{+L/2} \exp(-j(\kappa_0)\, x_n(y))\, dy$ (3) where ***p*** p_n is a polarity of the nth finger: ***p_n*** =(-1), if nth finger is grounded, and ***p_n*** =(+1), if nth finger is hot; κ_0 is a SAW wave number, κ_0 **= *ω/V*, *V*** is a **constant** SAW velocity for each ***y***, because of the **constant** ratio ***w(y)/p(y)***; $x_n(y)$ is the ***X***-coordinate of nth finger's center. The weighting is achieved by the varying of the fingers positions via **Y**-coordinate. The SAW velocity dispersion effect is **NOT** a degree of freedom for weighting for such an IDT. The same words are relevant to the equivalent prior art fan-type/tapered IDT, shown in Fig. 2 by Yatsuda.	The frequency characteristic of the IDT having trapezoidal fingers is: $A_{30}(\omega) = E(\omega)\sum_{n=1}^{N} p_n I_n \exp(-j\kappa_0 x_n)$ (4a) where the weighting coefficients ***I_n*** **vary** with finger number ***n***, **ONLY if the SAW velocity dispersion effect is present.** Now, the SAW wave number is dispersed along **Y**-coordinate: $\kappa_0 + \kappa(y)$, and the weighting coefficients ***I_n*** are calculated via the dispersion $\kappa(y)$. Control of the values ***I_n*** due to **varying** the fingers' shapes, which substantially different from the shape of the overall IDT, is the **novel degree of freedom,** and is the essence of the disclosure. An example calculation of frequency response for an IDT having fingers, shaped in form of curled brackets, is illustrated in Applicant's Fig. 6a (64).

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Used channel 2.
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